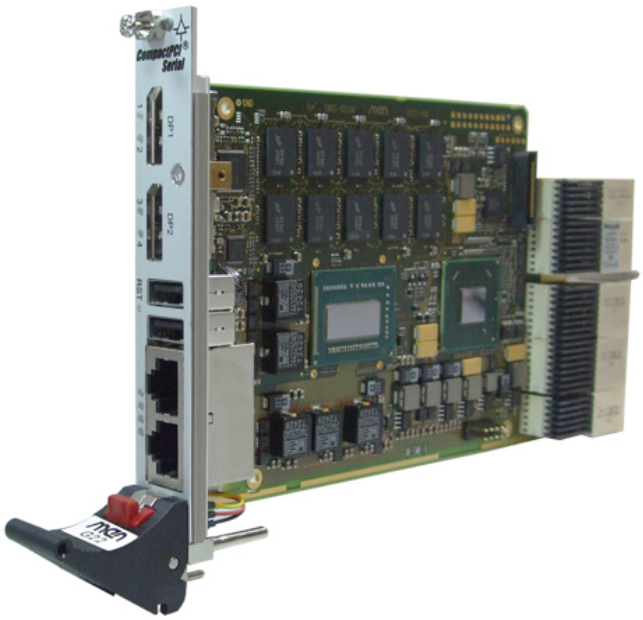
G22 – 3U CompactPCI® Serial Intel® Core™ i7 CPU Board

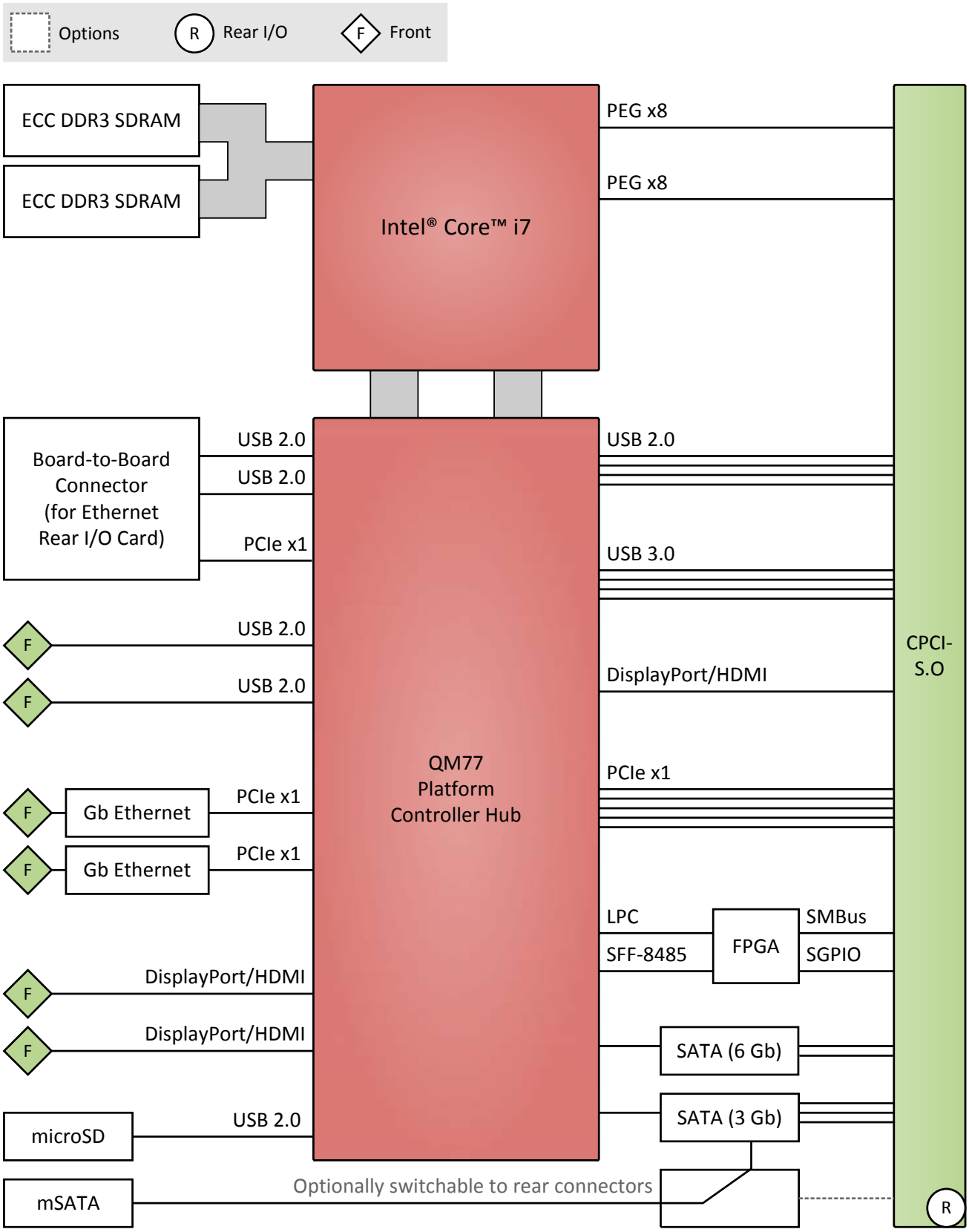
- **Intel® Core™ i7, 3rd generation**
- **Quad-core 64-bit processor**
- **4 HP system master and peripheral slot**
- **PICMG CPCI-S.0 CompactPCI® Serial**
- **4 or 8 GB DDR3 DRAM soldered, ECC**
- **mSATA and microSD™ card slots**
- **Standard front I/O: 2 DisplayPorts, 2 Gb Ethernet, 2 USB 2.0**
- **Standard rear I/O: 7 PCIe®, 4 USB 2.0, 4 USB 3.0, 5 SATA, DisplayPort®/HDMI**
- **Rear I/O via mezzanine board: up to 8 Gigabit Ethernet**
- **Intel® Turbo Boost, Hyper-Threading, AMT 8.0**
- **Open CL support**



The G22 is a versatile 4HP/3U single-board computer supporting a multitude of modern serial interfaces according to the CompactPCI® Serial standard. It is thus perfectly suited for data-intensive applications which require high computing-power. The CPU card is equipped with the Intel® third-generation Core i7 processor running at up to 3.3 GHz maximum turbo frequency and offering the latest multi-core processor architecture from Intel® with full 64-bit support. The processor frequency can be stepped down via the BIOS to lower power consumption and make the board more suitable for high temperatures. The G22 supports the Intel® Active Management technology which makes it possible to access the board via the network even when it is in soft-off or standby state.
For system security, a Trusted Platform Module is available on request.
The memory configuration of the G22 includes a state-of-the-art fast DDR3 DRAM which is soldered to the board to guarantee optimum shock and vibration resistance. An mSATA disk connected via a SATA channel and a microSD™ card device which is connected via a USB interface offer nearly unlimited space for user applications.

The board delivers an excellent graphics performance. Two DisplayPort® interfaces are accessible at the board front. Using an external adapter two HDMI or two DVI ports can also be realized. In addition the standard front I/O comprises two PCIe®-driven Gigabit Ethernet and two USB 2.0 ports.
Serial interfaces at the rear I/O connectors are 4 USB 2.0, 4 USB 3.0, 5 SATA interfaces, one DisplayPort® or HDMI, 5 PCI Express® x1 links, and two PEG x8 links. Up to eight Gigabit Ethernet interfaces can be implemented using a rear I/O adapter board.
A board management controller provides thermal supervision of the processor and a watchdog for the operating system.
The G22 operates in Windows® and Linux environments as well as under real-time operating systems that support Intel®'s multi-core architecture. The InsydeH2O™ EFI BIOS was specially designed for embedded system applications.
The G22 comes with a tailored passive heat sink within 4 HP height. All components are soldered for protection against shock and vibration according to applicable DIN, EN or IEC industry standards. As an option, the board can be equipped with an M12 Ethernet connector. The G22 is also ready for coating so that it can be used in humid and dusty environments and has a guaranteed minimum standard availability of 7 years. These features make the G22 perfectly suited for harsh environments.

Diagram


Options
R
Rear I/O
F
Front
ECC DDR3 SDRAM
ECC DDR3 SDRAM
Intel® Core™ i7
PEG x8
PEG x8
Board-to-Board Connector (for Ethernet Rear I/O Card)
USB 2.0
USB 2.0
PCIe x1
USB 2.0
USB 2.0
USB 2.0
USB 3.0
DisplayPort/HDMI
PCIe x1
QM77 Platform Controller Hub
CPCI-S.O
F
Gb Ethernet
PCIe x1
F
Gb Ethernet
PCIe x1
LPC
SFF-8485
FPGA
SMBus
SGPIO
DisplayPort/HDMI
DisplayPort/HDMI
SATA (6 Gb)
SATA (3 Gb)
microSD
USB 2.0
mSATA
Optionally switchable to rear connectors
R

Technical Data

CPU	■ Intel® Core™ i7-3615QE □ 2.3 GHz processor core frequency □ 3.3 GHz maximum turbo frequency □ 1066 MHz system bus frequency ■ Chipset □ QM77 Platform Controller Hub (PCH)
Board Management Controller	■ Power supervision and watchdog ■ Temperature measurement ■ 2 board status LEDs ■ 2 user LEDs ■ Reset button
Memory	■ 6 MB last level cache integrated in i7 processor ■ Up to 8 GB SDRAM system memory □ Soldered □ DDR3 with ECC support □ Up to 1066 MHz memory bus frequency ■ 64 Mbits boot Flash ■ Serial EEPROM 2 KB for factory settings ■ mSATA disk slot □ Connected via one SATA port from the PCH ■ Serial GPIO (SGPIO) □ One interface via CPCI-S.0 rear connector □ Compliant with SFF 8485 specification ■ One microSD™ card slot □ Via USB
Mass Storage	■ Serial ATA (SATA) □ Five channels via rear I/O (six if the link to the mSATA disk is not required, can be switched in BIOS) □ Four ports with transfer rates up to 3 Gbit/s (SATA Revision 2.x) □ Two ports with transfer rates up to 6 Gbit/s (SATA Revision 3.x) □ RAID level 0/1/5/10 support □ Hot-plug together with G501
Graphics	■ Integrated in QM77 chipset □ Maximum resolution: up to 2560x1600 ■ Two DisplayPort® connectors at front panel □ Optionally two DVI/HDMI ports via external adapter ■ One DisplayPort® at CPCI-S.0 rear connector □ Optionally SDVO or DVI/HDMI port
I/O	■ USB 2.0 □ Two USB 2.0 host ports via Series A connector at front panel □ Up to eight USB 2.0 host ports via CPCI-S.0 rear connector (depending on the number of used USB 3.0 ports) □ Two USB 2.0 host ports for connection of the rear I/O card □ EHCI implementation □ Data rates up to 480 Mbit/s ■ USB 3.0 □ Four USB 3.0 host ports via CPCI-S.0 rear connector □ Data rate up to 5 Gbit/s ■ Ethernet □ Two 10/100/1000Base-T Ethernet channels at the front □ RJ45 connectors at front panel □ Ethernet controllers are connected by two x1 PCIe® links □ Two onboard LEDs to signal LAN link, activity status and connection speed

Technical Data

Front Connections	■ Two DisplayPort® ■ Two USB 2.0 (Series A) ■ Two Ethernet (RJ45)
Rear I/O	■ 5 SATA (6 switchable in BIOS) ■ 1 DisplayPort® ■ 4 USB 2.0 ■ 4 USB 3.0 ■ 5 PCI Express® x1 links ■ 2 PEG x8 links ■ SGPIO
PCI Express®	■ Two x8 PCI Express® graphics links via CPCI-S.0 rear connector □ Data rate 985 MB/s (8 Gbit/s per lane) ■ Five x1 PCIe® links via CPCI-S.0 rear connector □ Data rate 500 MB/s (5 Gbit/s per lane) ■ Two x1 PCIe® links to connect local 1000Base-T Ethernet controllers □ Data rate 250 MB/s (2.5 Gbit/s per lane) ■ One x1 PCIe® link via for connection of the rear I/O card □ Data rate 500 MB/s (5 Gbit/s per lane)
Miscellaneous	■ Real-time clock with supercapacitor backup, battery-buffered
CompactPCI® Serial	■ Compliance with CompactPCI® Serial PICMG CPCI-S.0 Specification ■ System or peripheral slot
Electrical Specifications	■ Supply voltage/power consumption: □ +12V (9..16V), 4 A nominal, 5.8 A maximum □ +5V (-5%/+5%) standby voltage optional
Mechanical Specifications	■ Dimensions: conforming to CompactPCI® Serial specification for 3U boards ■ Front panel: 4HP with ejector ■ Weight: □ 208 g (w/o heat sink) □ 398 g (with heat sink and mSATA adapter)
Environmental Specifications	■ Temperature range (operation): □ Depends on system configuration (CPU, hard disk, heat sink...) □ Maximum: +85°C □ Minimum: -40°C (all processors) □ Airflow: min. 1.5 m/s, typical power dissipation tbd, with Windows® XP operating system, 1 Gb Ethernet, without CPU clock reduction ■ Temperature range (storage): -40..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300 m to + 3,000 m ■ Shock: 50 m/s², 30 ms ■ Vibration (function): 1 m/s², 5 Hz - 150 Hz ■ Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz ■ Conformal coating on request
MTBF	■ 455,629 h @ 40°C according to IEC/TR 62380 (RDF 2000)
Safety	■ Flammability □ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers ■ Electrical Safety □ Insulation measurement test according to EN 50155 (12.2.9.1) □ Voltage withstand test according to EN 50155 (12.2.9.2) □ Information technology equipment test according to EN 60950

Technical Data

EMC Conformity	■ EN 55022 (radio disturbance) ■ IEC 61000-4-2 (ESD) ■ IEC 61000-4-3 (electromagnetic field immunity) ■ IEC 61000-4-4 (burst) ■ IEC 61000-4-5 (surge) ■ IEC 61000-4-6 (conducted disturbances)
BIOS	■ InsydeH2O™ UEFI Framework
Intel® Active Management Technology	■ Out of Band (OOB) Access □ Power off Access □ Independent of OS status □ Power status control □ Keyboard-Video-Mouse (KVM) Viewer (VNC-compatible) □ IDE-Redirect □ Serial-over-LAN ■ Manageability Engine in Chipset ■ Network Filters in Chipset ■ Dedicated Flash Storage Area
Software Support	■ Windows® ■ Linux ■ VxWorks® (on request) ■ QNX® (on request) ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	Clock	Cores/Threads	System RAM	mSATA/microSD	Operating Temperature
02G022-00	Celeron 1047UE	1.4 GHz	2/2	2 GB	0 MB	-40..+85°C
02G022-01	Core i7-3615QE	2.3 GHz	4/8	4 GB	0 MB	0..+45°C

Options

CPU	■ Intel® Core™ i7 ■ Intel® Core™ i5 ■ Intel® Core™ i3 ■ Intel® Celeron® ■ For more details please see the overview matrix of supported processor types
Memory	■ System RAM □ 2 GB, 4 GB, 8 GB or 16 GB (16 GB when components available) ■ mSATA disk □ 0 MB up to maximum available ■ microSD™ card □ 0 MB up to maximum available
I/O	■ Ethernet □ One Gigabit Ethernet on M12 connector instead of two interfaces on RJ45
Rear I/O	■ PCI Express® □ 8 PCI Express® lanes ■ Ethernet □ Up to eight Gigabit Ethernet interfaces on the backplane using rear I/O card (e.g. GM1)
Operating Temperature	■ Depends on system configuration (CPU, hard disk, heat sink...) ■ Maximum: +85°C ■ Minimum: -50°C
Cooling Concept	■ Also available with conduction cooling in MEN CCA frame

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

Ordering Information

Standard G22 Models	**02G022-00**	Intel® Celeron® 1047UE 1.4 GHz, 2 GB DDR3 DRAM with ECC, -40..+85°C screened
	02G022-01	Intel® Core™ i7-3615QE SV, 2.3 GHz, 4 GB DDR3 DRAM with ECC, 0..+45°C
	02G022-07	Intel® Celeron® 1047UE 1.4 GHz, 2 GB DDR3 DRAM with ECC, 1 M12 Ethernet connector, -40..+85°C screened, conformal coating
	02G022-08	Intel® Core™ i7-3615QE SV, 2.3 GHz, 4 GB DDR3 DRAM with ECC, 1 M12 Ethernet connector, 0..+60°C screened, conformal coating
Related Hardware	**08GM01-00**	CompactPCI® Serial 4x Gigabit Ethernet rear I/O mezzanine card, -40..+85°C screened
	08GM02-00	CompactPCI® Serial 8x Gigabit Ethernet rear I/O mezzanine card, -40..+55°C screened
	08GM03-00	CompactPCI® Serial 4x Gigabit Ethernet rear I/O mezzanine card, -40..+85°C screened
Memory	**0751-0046**	MicroSD card, 2 GB, -40..+85°C
	0751-0051	SSD mSATA, 8 GB, -40..+85°C
	0751-0052	MicroSD card, 4 GB, -40..+85°C
Systems & Card Cages	**0701-0058**	CompactPCI® Serial 19" 4U/84 HP rack-mount enclosure for 3U cards (vertical), 9-slot backplane, system slot left, full mesh, 460 W ATX PSU 90..264VAC, 1U fan tray with 2x 12 VDC fans, 0..+45°C
	MEN delivers turn-key systems completely installed (hardware, operating system, accessories), wired and tested. Different rack sizes, power supplies and backplanes on request. For details please contact your local sales representative.	
Miscellaneous Accessories	**05G000-00**	Front panel kit for use of 3U G2x family CPU cards with 6U 8HP front
	0780-0005	DisplayPort® to DVI-D adapter, 20 cm
	0780-0006	Active DisplayPort® (DP) to single link DVI-D adapter, 20cm, max. resolution 1920x1200, AMD / ATI Eyefinity technology
Software: Linux	This product is designed to work under Linux. See below for all available separate software packages.	
	13MD05-90	MDIS5 System (and Device Driver) Package (MEN) for Linux. This software package includes most standard device drivers available from MEN.

Ordering Information

Software: Windows®	This product is designed to work under Windows®. See below for all available separate software packages.	
	10Y000-78	Windows® Embedded Standard 7 BSP for F19P, F21P, F22P, F23P, G20, G22, CB70C, CB70, XM2, MM2, BC50M, BC50I, BL50W, BL50S, BC70M, BL70S, BL70W, BL70E, DC2, DC13, F205, F206, F210, F215, F216, G215, P506, P507 and P511
	13G020-77	Windows® Installset (MEN) for G20 and G22 (Includes all free drivers developed by MEN for the supported hardware.)
	13T003-70	Windows® chipset driver (Intel®) for F14, F15, F17, F18, F18E, F19P, F21P, F22P, G20, G22, XM2, CB70C, D9, D6, D7, D601, A19 and A20
	13T010-70	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, CB70C, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, GM3, G211, G211F, SC24, BC50I, BC50M, BL50W, BL50S, BL70W and BL70S
	13T020-70	Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, GM3, G211, G211F, XM2, CB70C, SC24, BC50I, BC50M, BL50W, BL50S, BL70W and BL70S
	13T029-70	Windows® Intel® Management Engine Driver (Intel®) for G22, F22P and CB70C
	13T031-70	Windows® XP 32-bit graphics driver (Intel®) for F21P and G22
	13T034-70	Windows® 7/8 32-bit graphics driver (Intel®) for F22P, G22, CB70C, SC25, BL70W and BL70S
	13T035-70	Windows® 7/8 64-bit graphics driver (Intel®) for F22P, G22, CB70C, SC25, BL70W and BL70S
Software: Firmware/BIOS	This product includes a specially adapted BIOS.	
	14G022-00	System BIOS for G22

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart 3U CompactPCI® Serial CPU and I/O cards » Download	
	20G022-00	G22 User Manual
	20G022-ER	G22 Errata
	21APPN014	Application Note: Switching on the AMT function
	21APPN015	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS
	21APPN016	Application Note: Accessing SMBus under Linux Kernel 3.2 on MEN Intel® Boards

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